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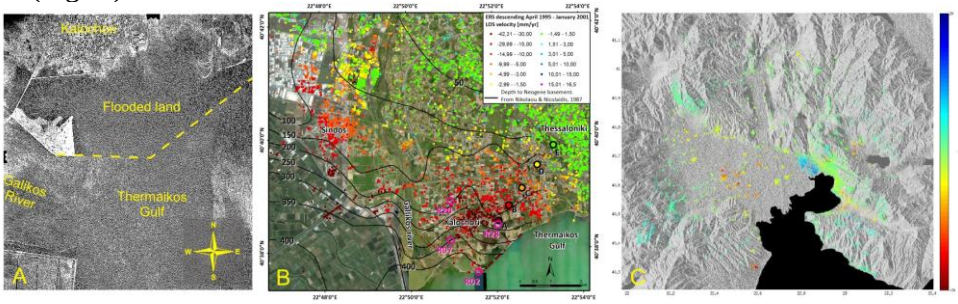
Abstract

Land subsidence caused by the overexploitation of the aquifers manifest with an increasing frequency in several regions of Greece. In the broader Kalochori village region, at the west side of Thessaloniki, the first signs of subsidence were recorded in 1965 in the form of a progressive marine invasion. In 1969, during a period of intensive rainfall, the seawater reached the southern houses of the village, forcing the construction of embankments along the entire coastline. As a result of the continuous subsidence, reaching next to the coastline maximum values of 3–4 m, the embankments were destroyed and reconstructed several times (Fig. A). The land subsidence phenomena continue taking place since 2004, when sudden changes at the economic activities lead to the reduction of the water pumping and the gradual recharge of the aquifers. The aquifer recharge impressively changed the motion trend, from subsidence to uplift.

Beside ground truth data the land subsidence trends have been also identified via multi-temporal InSAR techniques. In the framework of Terrafirma project, a set of SAR images acquired in 1995–2001 by the ESA satellites ERS1, 2 were processed with PSI technique identifying subsiding deformation rates of roughly 4.5 cm/year (Fig. B). Following research, using PSI and SBAS multi-temporal Interferometric approach, was also applied for the analysis of a 2 decades long ERS 1, 2 and ENVISAT dataset (1992 - 2010). The velocities estimated for the ERS dataset are in excellent agreement with previous studies. The intriguing output of the ENVISAT data archive (2003 - 2010) was an uplift motion trend, during the second decade (Fig. C).



A) Aerial photograph presenting the flooded area after the collapse of the embankment in 1973. B) land subsidence LOS deformation rates from ERS1/2 data (1995- 2001), C) PS results from Envisat data (2002-2010) indicating uplift due to ground water recharge.